

Fundamentals of PSCAR and Overcoming the Stochastics Problems of EUV Lithography

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In EUV lithography, the most critical issue was low intensity of EUV light source for a long time. Now EUV light source power is at 250 W. The most critical problem for HVM with EUV lithography is the stochastics problems. The light source intensity and the resist sensitivity are complementary each other. 250 W EUV light source and 20 mJ/cm² EUV resists were required for HVM with EUV lithography. However, EUV lithography using 20 mJ/cm² EUV resist cannot provide enough of a process window by stochastics problems such as micro-bridges or line-breaks of lines and spaces (missing or kissing contact holes). No good solutions for stochastics problems have been reported.

The present keynote presentation shows two topics. The first topic is fundamentals of PSCAR and some improvement of stochastics problems by PSCAR. The second topic is the solution of both very high resist sensitization and overcoming stochastics problems of EUV lithography patterning such as micro-bridges or line-breaks of lines and spaces (missing or kissing contact holes). The new solution is introduced based on basic science of lithographic processes of resist materials but from the very different viewpoints of current lithographic way of dealing with stochastics problems. The new solution is robust properties and response with respect to random noise. The new solution can be applied to several generations of EUV lithography, although stochastics problems become more severe with higher resolution patterning of conventional chemically amplified resists.

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